

Weekly Report

Period: 10/29/2012 – 11/04/2012

Research

This week, I read several papers on uncertainty visualization and parameter space analysis [1,2,3]. I also went through the tutorial on uncertainty visualization in visweek 2012. Here, I will briefly summarize these materials and give a short description of my proposal on my ongoing work.

As illustrated in Fig.1, inspired by work [1,2], we also use HyperSlice to represent the distribution of fiber tracking parameters and the results. The green squares in this view correspond to the distribution patterns of tracking parameters. And the pink squares for the tracking result distribution created by a manifold learning algorithm (LLE). The points in pink squares correspond to a KDE map generated by our framework. The advantage of this view is that, we can easily explore influence to fiber tracking of each pair of parameters. Typically, to explore the result of a specific pair of parameters, we have to fix all other parameters. This operation can be done with the help of the parameter star-coordinate view.

Potential interesting results may include:

- More outliers in the pink squares means more uncertainty with the correspond parameters
- Some linearity or non-linearity can be found. For example, we can constrain our tracking parameter as a linear distribution to explore whether the resulting visualizations also have the same distribution

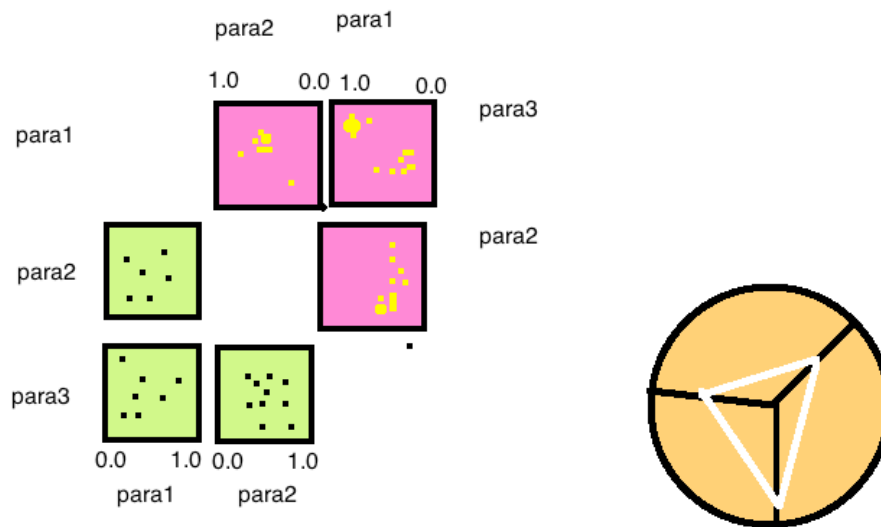


Fig. 1 A major view of our work. Here there are three fiber-tracking parameters: para1, para2, para3. All of them are normalized to [0.0, 1.0].

Besides paper reading, I also implemented the projection framework in this week, and conducted a robust test for my code. So far, only the KDE part and the LLE algorithm implementation work need to be done.

Work to be done in next week

- Implement KDE and LLE
- Implement the proposed parameter space analysis framework

Reference:

- [1] Stefan Bruckner and Torsten Mo'ller . Result-Driven Exploration of Simulation Parameter Spaces for Visual Effects Design, TVCG, 2010.
- [2] Thomas Torsney-Weir, Ahmed Saad, Torsten Mo'ller, et al. Tuner: Principled Parameter Finding for Image Segmentation Algorithms Using Visual Response Surface Exploration, TVCG, 2011.
- [3] W. Berger, H. Piringer, P. Filzmoser, and E. Gröller. Uncertainty-Aware Exploration of Continuous Parameter Spaces Using Multivariate Prediction, TVCG, 2011.